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CLAIMS

1. A fuel reformer, comprising:
  - a reforming element (7) comprising at least one reforming catalyst passage (22) supporting a reforming catalyst which generates reformat gas from fuel;
  - a combustion element (8) having at least one combustion gas passage (11), which heats the reforming element (7) by the heat of combustion gas generated by burning the generated reformat gas supplied in air introduced in said at least one combustion gas passage (11), the reforming element (7) and combustion element (8) being laminated in the fuel reformer; and
  - plural supply holes (13) arranged in a line along said at least one combustion gas passage (11), each supply hole (13) communicating with said at least one combustion gas passage (11),wherein at least part of the generated reformat gas is supplied to each supply hole, and is burnt downstream of each supply hole.
2. The fuel reformer as defined in Claim 1, wherein the plural supply holes (13) are disposed at a substantially predetermined interval along said at least one combustion gas passage (11).
3. The fuel reformer as defined in Claim 1, wherein the reforming element (7) comprises a reformat gas manifold (16) communicating with said at least one reforming catalyst passage (22) and collecting the generated reformat gas; and plural supply passages (23) communicating with the reformat gas manifold (16), said at least one reforming catalyst passage (22) being disposed between the supply passages (23),
  - the fuel reformer (1) comprising:
    - a partition (6/71) disposed between the plural supply passages (23) and said at least one combustion gas passage (11), the partition (6/71) having the plural supply holes (13) in parts where the plural supply passages (23) lie over or under said at least one combustion gas passage (11),
  - wherein each supply passage (23) communicates with a corresponding one of the plural supply holes, so that the reformat gas of the reformat gas manifold (16) is supplied to said at least one combustion gas passage via the supply passages and supply holes.
4. The fuel reformer as defined in Claim 3, comprising a starting material vapor manifold (15) to which a vapor of the fuel is supplied and which communicates with said at least one reforming catalyst passage (22).
5. The fuel reformer as defined in Claim 3, wherein the partition (6/71) is a horizontal part (71) provided in the combustion element (8) or a partition plate (6) interposed between the reforming element and combustion element, and the horizontal part (71) and partition plate (6) are substantially perpendicular to the lamination direction of the reforming element (7) and combustion element (8).

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6. The fuel reformer as defined in Claim 3, wherein the supply passages (23) open into the reformat gas manifold (16), and

the reformat gas of the reformat gas manifold (16) is supplied to said at least one combustion gas passage via the supply passages (23) and supply holes (13).

7. The fuel reformer as defined in Claim 3, wherein the combustion element (8) further comprises a main passage (40) which supplies the reformat gas to the supply passages (23) of the reforming element (7), the main passage (40) communicating with the reformat gas manifold (16) via a distribution manifold (42), and

the partition (6/71) is disposed between the main passage (40) and supply passages (23), and further comprises plural distribution holes (41) which connect the main passage (40) and supply passages (23).

8. The fuel reformer as defined in Claim 7, wherein the distribution manifold (42) and reformat gas manifold (16) are configured to communicate by an external pipe (43) of the fuel reformer.

9. The fuel reformer as defined in any of Claims 1 to 8, wherein the supply passages (23) of the reforming elements lie over or under said at least one combustion gas passage (11) of the combustion elements.

10. The fuel reformer as defined in Claim 4, wherein the reforming element (7) comprises a starting material manifold (14) to which liquid fuel is supplied, and a starting material vaporization passage (21) connecting the starting material vapor manifold (15) and the starting material manifold,

wherein the liquid fuel from the starting material manifold vaporizes in the starting material vaporization passage (21), and

wherein the vaporized fuel is introduced into the starting material vapor manifold (15).

11. The fuel reformer as defined in Claim 10, wherein at least one of the supply passages (23) and at least one of the supply holes (13) are disposed between the starting material vaporization passage (21) and one of said at least one reforming catalyst passage (22) closest to the starting material vaporization passage (21).

12. The fuel reformer as defined in Claim 6, comprising additional fuel supply means (31) which supplies additional fuel to at least one of the openings of the supply passages (23) in the reformat gas manifold (16).

13. The fuel reformer as defined in Claim 7 or 8, comprising additional fuel supply means (44) which supplies additional fuel to the distribution manifold (42) or the external pipe (43).

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14. The fuel reformer as defined in any of Claims 1 to 8, wherein said at least one reforming catalyst passage (22) of the reforming elements (7) is formed by a groove (22A), and a partition member (6/48) which seals the groove (22A).

15. The fuel reformer as defined in Claim 1, wherein said at least one combustion gas passage (11) of the combustion element (8) is formed by a groove (11A), and a partition member (6/48) which seals the groove (11A) or a horizontal part (71) of the reforming element (7), the horizontal part (71) being substantially perpendicular to the lamination direction of the reforming element (7) and combustion element (8).

16. The fuel reformer as defined in Claim 15, wherein a wall surface of said at least one combustion gas passage (11) of the combustion element (8) supports an oxidation catalyst.

17. The fuel reformer as defined in any of Claims 1 to 8, wherein the pressure in the combustion element (8) is set lower than the pressure in the reforming element (7).

18. The fuel reformer as defined in any of Claims 1 to 8, comprising a hydrogen separation membrane element (48) in contact with the reforming element (7), the hydrogen separation membrane element (48) comprising at least one hydrogen penetration membrane (54) and a hydrogen-rich gas passage (55) connected to a hydrogen-rich gas outlet,

wherein hydrogen generated in the reforming element penetrates the hydrogen penetration membrane and flows through the hydrogen-rich gas passage (55).

19. The fuel reformer as defined in Claim 18, wherein the hydrogen membrane element (48) comprises said at least one hydrogen penetration membrane (54) alongside the hydrogen-rich gas passage (55), and

the reforming element (7) and combustion element (8) are laminated in this order on said at least one hydrogen penetration membrane (54) on the opposite side to the hydrogen-rich gas passage (55).

20. The fuel reformer as defined in any of Claims 4 to 8, wherein the starting material vapor manifold (15) and reformat gas manifold (16) are formed so that they are open to the outer circumferential surface of the fuel reformer when the combustion element (8), reforming element (7), partition (6) and/or hydrogen penetration membrane element (48) are laminated, and wherein the starting material vapor manifold (15) and reformat gas manifold (16) are sealed by their respective cover member.